VOLUME

14

1966·CONTENTS

ANIMAL BEHAVIOUR

EDITORS

P. P. G. BATESON
CAMBRIDGE

L. R. ARONSON
NEW YORK

ASSISTANT EDITOR

ETHEL TOBACH
NEW YORK

LONDON
BAILLIÈRE, TINDALL & CASSELL

Association for the Study of Animal Behaviour

founded 13th March 1936

President: H. KALMUS, M.D., SC.D., *Galton Laboratory, University College, London WC1*

Hon. Secretary: PEGGY E. ELLIS, D.SC., PH.D., *The Anti-locust Research Centre, College House, Wright's Lane, London W8*

Hon. Assistant Secretary: U. WEIDMANN, D.PHIL., *Department of Psychology, University of Tennesse, Knoxville, Tennessee*

Hon. Treasurer: C. R. RIBBANDS, M.A., SC.D., *School of Agriculture, Downing Street, Cambridge*

Hon. Editor: P. P. G. BATESON, M.A., PH.D., *Sub-department of Animal Behaviour, High Street, Madingley, Cambridge*

Hon. Specialist Editor of the Animal Behaviour Section of International Abstracts of Biological Sciences: YVETTE SPENCER-BOOTH, M.A., B.SC., *Sub-department of Animal Behaviour, High Street, Madingley, Cambridge*

Hon. Librarian: R. A. HINDE, D.PHIL., SC.D., *Sub-department of Animal Behaviour, High Street, Madingley, Cambridge*

Council Members: J. A. Ambrose, B.SC., M.A., PH.D.; S. A. Barnett, M.A.; J. D. Carthy, M.A., PH.D.; J. H. Crook, PH.D.; J. M. Cullen, D.PHIL.; J. T. Eayrs, PH.D., D.SC.; J. B. Free, M.A., PH.D.; O. E. Lowenstein, D.SC., F.R.S.; F. V. Smith, M.A., PH.D.; N. S. Sutherland, D.PHIL.; L. Weiskrantz, B.A., PH.D.

Animal Behavior Society

in cooperation with the Ecological Society of America and the American Society of Zoologists

President: HOWARD E. WINN, PH.D., *University of Rhode Island, Kingston, Rhode Island*

Past President: E. B. HALE, PH.D., *Pennsylvania State University, University Park, Penn.*

1st President Elect: MARTIN W. SCHEIN, PH.D., *Director, CUEBS, 1717 Massachusetts Avenue, N.W., Washington, D.C.*

2nd President Elect: CHARLES H. SOUTHWICK, PH.D., *Johns Hopkins University, Baltimore, Md.*

Secretary: CHARLES C. CARPENTER, PH.D., *University of Oklahoma, Norman, Oklahoma*

Treasurer: JAMES C. BRADDOCK, PH.D., *Michigan State University, East Lansing, Mich.*

Program Chairman: EDWIN M. BANKS, PH.D., *University of Illinois, Urbana, Ill.*

Editor: L. R. ARONSON, PH.D., *Department of Animal Behavior, American Museum of Natural History, Central Park West at 79th Street, New York 10024*

In addition to those listed above, the Editors wish to thank the following scientists who have helped them during the course of the year:

H. E. Adler; R. J. Andrew; J. M. Arnold; N. H. Azrim; K. Bare; H. Barry III; H. Barth, Jr.; G. B. Berkson; G. Bermant; J. B. Best; H. G. Birch; M. E. Bitterman; C. M. Bogert; J. C. Braddock; F. H. Bronson; F. A. Brown; J. H. Bruell; J. B. Calhoun; D. K. Candland; S. I. Chorover; K. J. Connolly; J. H. Crook; M. D'Amato; V. H. Denenberg; Carol Diakow; M. Diamond; W. C. Dilger; J. F. Eisenberg; J. T. Emlen; R. Fantz; G. S. Fraenkel; H. Frings; Eleanor Gibson; Patricia S. Goldman; G. Gottlieb; E. B. Hale; E. W. Hansen; J. Hirsch; G. M. Hughes; J. McV. Hunt; D. Jacobs; M. Jones; I. C. Kaufman; J. King; K. F. Koopman; L. Levine; H. Lissman; D. F. Lott; D. J. McFarland; A. Manning; G. V. T. Matthews; A. Mauro; N. E. Miller; Sheila Miller; H. Moltz; K. E. Moyer; V. J. Polidora; Harriet Rheingold; C. N. Rettenmeyer; M. P. M. Richards; J. Rosenblatt; L. A. Rosenblum; D. M. Ross; S. Salter; W. N. Schoenfeld; H. O. Schwassman; J. P. Scott; Evelyn Shaw; H. Silverman; M. J. Simpson; W. Sluckin; C. H. Southwick; Yvette Spencer-Booth; J. A. Stern; Joan G. Stevenson; A. Still; W. Tavolga; P. Teitelbaum; J. Treherne; G. Turkewitz; J. M. Warren; M. Weitzman; M. J. Wells; E. Wever; R. White; E. O. Wilson; J. Wittenberg; J. Wodinsky; P. T. Young; R. G. Zweifel

CONTENTS OF VOLUME 14

Original Contributions

ABEELEN, VAN J. H. F. Effects of Genotype on Mouse Behaviour 218

ALEXANDER, G. & WILLIAMS, D. Teat-Seeking Activity in Lambs during the First Hours of Life 166

ANDREW, R. J. Precocious Adult Behaviour in the Young Chick 485

ANDREW, R. J. The Relation between the Following Response and Precocious Adult Behaviour in the Chick 501

L'ANGELLIER, A. B. *see* MCFARLAND, D. J.

BAENNINGER, LOUISE P. The Reliability of Dominance Orders in Rats 367

BARSEL, GAIL ELKIN, *see* LEVINE, LOUIS.

BEDFORD, G. O. & CHINNICK, L. J. Conspicuous Displays in Two Species of Australian Stick Insects 518

BICK, GEORGE H. & SULZBACH, DIANE. Reproductive Behaviour of the Damselfly, *Hetaerina americana* (Fabricius) (Odonata: Calopterygidae) 156

BIRCH, HERBERT G. *see* TURKEWITZ, GERALD.

BOSSERT, WILLIAM H. *see* HAZLETT, BRIAN A.

BOWER, T. G. R. Heterogeneous Summation in Human Infants 395

BOYES, T. *see* SMITH, F. V.

CANDLAND, DOUGLAS K. & MILNE, DAVID. Species Differences in Approach-Behaviour as a Function of Developmental Environment 539

CARROLL, F. D. *see* WAGNON, K. A.

CHINNICK, L. J. *see* BEDFORD, G. O.

CLARK, LINDA H. & SCHEIN, MARTIN W. Activities Associated with Conflict Behaviour in Mice 44

COLLIAS, N. E., COLLIAS, E. C., HUNSAKER, D. & MINNING, L. Locality Fixation, Mobility and Social Organization within an Unconfined Population of Red Jungle Fowl .. 550

CONNOLLY, KEVIN. Locomotor Activity in *Drosophila*. II. Selection for Active and Inactive Strains 444

CORNWELL, ANNE C. *see* TURKEWITZ, GERALD.

COWLEY, J. J. & GRIESEL, R. D. The Effect on Growth and Behaviour of Rehabilitating First and Second Generation Low Protein Rats 506

CRONLY-DILLON, J. R. *see* MUNTZ, W. R. A.

DAVIDSON, JULIAN M. Characteristics of Sex Behaviour in Male Rats Following Castration .. 266

DEVINE, JAMES V. *see* ROHLES, JR, FREDERICK H.

DIAKOW, CAROL ANNE, *see* LEVINE, LOUIS.

EHRMAN, LEE. Mating Success and Genotype Frequency in *Drosophila* 332

ESSMAN, WALTER B. The Development of Activity Differences in Isolated and Aggregated Mice 406

EVANS, S. M. Non-Associative Avoidance Learning in Nereid Polychaetes 102

EVANS, S. M. Non-Associative Behavioural Modifications in the Polychaete *Nereis diversicolor* 107

FERGUSON, GARY W. Releasers of Courtship and Territorial Behaviour in the Side Blotched Lizard *Uta stansburiana* 89

FLYNN, JOHN P. *see* MACDONNELL, MALCOLM.

FOLMAN, Y. & VOLCANI, R. Copulatory Behaviour of the Prepubertally Castrated Bull .. 572

FOX, M. W. & STELZNER, D. Behavioural Effects of Differential Early Experience in the Dog .. 273

FOX, M. W. & STELZNER, D. Approach/Withdrawal Variables in the Development of Social Behaviour in the Dog 362

GANS, CARL. An Inexpensive Arrangement of Movie Camera and Electronic Flash as a Tool in the Study of Animal Behaviour 11

GODDARD, GRAHAM V. *see* PALEN, GARY F.

GOSSETTE, ROBERT, GOSSETTE, MADELEINE & INMAN, NELSON. Successive Discrimination Reversal Performance by the Greater Hill Myna 50

GOSSETTE, R. L., GOSSETTE, M. F. & RIDDELL, W. Comparisons of Successive Discrimination Reversal Performances among Closely and Remotely Related Avian Species .. 560

GOTTLIEB, GILBERT. Species Identification by Avian Neonates: Contributory Effect of Perinatal Auditory Stimulation 282

GRIESEL, R. D. *see* COWLEY, J. J.

GRIFFIN, DONALD R. *see* WILLIAMS, TIMOTHY C.

GUITON, PHILIP. Early Experience and Sexual Object-Choice in the Brown Leghorn .. 534

GUPTA, B. D. *see* HOLLAND, H. C.

HAZLETT, BRIAN A. & BOSSERT, WILLIAM H. Additional Observations on the Communications Systems of Hermit Crabs 546

HEEZEN, KEITH L. *see* MECH, DAVID L.

HILL, CHARLES W. The Learning of Directional Movements and Movement Reversals by Monkeys 320

HOLLAND, H. C. & GUPTA, B. D. Some Correlated Measures of Activity and Reactivity in Two Strains of Rats Selectively Bred for Differences in the Acquisition of a Conditioned Avoidance Response 574

HUGHES, D. A. On the Dorsal Light Response in a Mayfly Nymph 13

HUGHES, D. A. The Role of Responses to Light in the Selection and Maintenance of Microhabitat by Nymphs of Two Species of Mayfly 17

HUGHES, R. N. Some Observations of Correcting Behaviour in Woodlice (*Porcellio scaber*) .. 319

HUNSAKER, D. *see* COLLIAS, N. E.

IBBOTSON, ALAN. Aggregation in *Aphis fabae* Scop. II. Visual Components 251

INMAN, NELSON, *see* GOSSETTE, ROBERT.

JOHNSON, DENNIS L. & WENNER, ADRIAN M. A Relationship between Conditioning and Communication in Honey Bees 261

CONTENTS

107 JOHNSON, DENNIS L. *see also* WENNER, ADRIAN M.

89 KELLER, JR, E. C., MATTONI, R. H. T. & SEIGER, M. S. B. Preferential Return of Artificially Displaced Butterflies 197

572 KOHN, ALAN J. & WATERS, VIRGINIA. Escape Responses of Three Herbivorous Gastropods to the Predatory Gastropod *Conus textile* 340

273 KUPFERMANN, IRVING. Turn Alternation in the Pill Bug (*Armadillidium vulgare*) 68

LANDENBERGER, DONALD E. Learning in the Pacific Starfish *Pisaster giganteus* 414

362 LARIMER, JAMES L. & TINDEL, JERRY R. Sensory Modifications of Heart Rate in Crayfish .. 239

11 LEVINE, LOUIS, BARSEL, GAIL ELKIN & DIAKOW, CAROL ANNE. Mating Behaviour of Two Inbred Strains of Mice 1

LEVY, LINDA, *see* TURKEWITZ, GERALD.

50 LIN, NORMAN. Copulatory Behaviour of the Cicada Killer Wasp, *Sphecius speciosus* .. 130

560 LINDSAY, D. R. Modification of Behavioural Oestrus in the Ewe by Social and Hormonal Factors 73

LINDSAY, D. R. Mating Behaviour of Ewes and its Effect on Mating Efficiency 419

282 LOWE, H. L. & STEVENSON, JOAN G. A Response-Controlled Tape Loop 184

LOY, R. G. *see* WAGNON, K. A.

MCCUTCHEON, F. H. Pressure Sensitivity, Reflexes, and Buoyancy Responses in Teleosts .. 204

534 MACDONNELL, MALCOLM & FLYNN, JOHN P. Sensory Control of Hypothalamic Attack .. 399

MCFARLAND, D. J. & L'ANGELLIER, A. B. Disinhibition of Drinking During Satiation of Feeding Behaviour in the Barbary Dove 463

546 MACKINTOSH, N. J., MACKINTOSH, JANET, SAFRIEL-JORNE, ORA & SUTHERLAND, N. S. Over-training, Reversal and Extinction in the Goldfish 314

320 MAGID, AHMED MOHAMED ABDEL. Breathing and Function of the Spiracles in *Polypterus senegalus* 530

MAGNUSON, JOHN J. & PRESCOTT, JOHN H. Courtship, Locomotion, Feeding, and Miscellaneous Behaviour of Pacific Bonito (*Sarda chiliensis*) 54

574 MATTONI, R. H. T. *see* KELLER, JR, E. C.

13 MECH, L. DAVID, HEEZEN, KEITH L. & SINIFF, DONALD B. Onset and Cessation of Activity in Cottontail Rabbits and Snowshoe Hares in Relation to Sunset and Sunrise .. 410

17 MICHENER, CHARLES D. Interaction among Workers from Different Colonies of Sweat Bees 319 (Hymenoptera, Halictidae) 126

MILLIGAN, MARILYN. Vocal Responses of White-Crowned Sparrows to Recorded Songs of Their Own and Another Species 356

251 MILNE, DAVID, *see* CANDLAND, DOUGLAS K.

MINNING, L. *see* COLLIAS, N. E.

261 MOREAU, TINA, *see* TURKEWITZ, GERALD.

MUMA, MARTIN H. Mating Behaviour in the Solpugid Genus *Eremobates* Banks 346

MUNTZ, W. R. A. & CRONLY-DILLON, J. R. Colour Discrimination in Goldfish 351

MYRBERG, JR, ARTHUR A. Parental Recognition of Young in Cichlid Fishes 565

NARDA, RAVI DUTT. Analysis of the Stimuli Involved in Courtship and Mating in *D. malerkotliana* (Sophophora, Drosophila) 371

NOIROT, ELIANE. Ultra-sounds in Young Rodents. I. Changes with Age in Albino Mice .. 459

NOIROT, ELIANE & RICHARDS, M. P. M. Maternal Behaviour in Virgin Female Golden Hamsters: Changes Consequent upon Initial Contact with Pups 1

PALEN, GARY F. & GODDARD, GRAHAM V. Catnip and Oestrous Behaviour in the Cat .. 372

PALMITER, RICHARD D. Absence of Olfactory Conditioning in an Oligophagous Insect, the Corn Earworm, *Heliothis zea* (Boddie) 236

PHILLIPS, RICHARD E. & SIEGEL, P. B. Development of Fear in Chicks of Two Closely Related Genetic Lines 84

PRESCOTT, JOHN H. *see* MAGNUSON, JOHN J.

REYES, ALFREDO Y. *see* SCHNEIRLA, T. C.

REYNIERSE, JAMES H. Some Effects of Light on the Formation of Aggregations in Planaria *Phagocata gracilis* 246

RICHARDS, M. P. M. Maternal Behaviour in Virgin Female Golden Hamsters (*Mesocricetus auratus* Waterhouse): the Role of the Age of the Test Pup 303

RICHARDS, M. P. M. Maternal Behaviour in the Golden Hamster: Responsiveness to Young in Virgin, Pregnant, and Lactating Females 310

RICHARDS, M. P. M. Activity Measured by Running Wheels and Observation during the Oestrous Cycle, Pregnancy and Pseudopregnancy in the Golden Hamster .. 450

RICHARDS, M. P. M. *see also* NOIROT, ELIANE.

RIDDELL, W. *see* GOSSETTE, R. L.

ROBEL, ROBERT J. Booming Territory Size and Mating Success of the Greater Prairie Chicken (*Tympanuchus cupido pinnatus*) 328

ROHLES, JR, FREDERICK H. & DEVINE, JAMES V. Chimpanzee Performance on a Problem Involving the Concept of Middleness 159

ROLLINS, W. C. *see* WAGNON, K. A.

ROWELL, T. E. Hierarchy in the Organization of a Captive Baboon Group 430

SAFRIEL-JORNE, ORA, *see* MACKINTOSH, N. J.

SALTER, S. H. A Note on the Recording of Egg Activity 41

SCHEIN, MARTIN W. *see* CLARK, LINDA H.

SCHNEIRLA, T. C. & REYES, ALFREDO Y. Raiding and Related Behaviour of Two Surface-Adapted Species of the Old World Doryline Ant, *Aenictus* 132

SEIGER, M. S. B. *see* KELLER, JR, E. C.

CONTENTS

SIEGEL, P. B. *see* PHILLIPS, RICHARD E.

SINIFF, DONALD B. *see* MECH, DAVID L.

SMITH, F. V., VAN-TOLLER, C. & BOYES, T. The 'Critical Period' in the Attachment of Lambs and Ewes 120

SMITH, F. V. & TEMPLETON, W. B. Genetic Aspects of the Response of the Domestic Chick to Visual Stimuli 291

SPIETH, HERMAN T. Drosophilid Mating Behaviour: the Behaviour of Decapitated Females .. 226

STELZNER, D. *see* FOX, M. W.

STEVENSON, JOAN G. *see* LOWE, H. L.

STILL, A. W. Coercion and Spontaneous Repetition in Rats 163

SULZBACH, DIANE, *see* BICK, GEORGE H.

SURTEES, GORDON. Locomotory Behaviour of Pyrethrum-Resistant and Susceptible Strains of Grain Weevil, *Sitophilus granarus* (L.) (Coleoptera, Curculionidae) 201

SUTHERLAND, N. S. *see* MACKINTOSH, N. J.

SWANSON, HEIDI H. Sex Differences in Behaviour of Hamsters in Open Field and Emergence Tests: Effects of Pre- and Post-pubertal Gonadectomy 522

TEMPLETON, W. B. *see* SMITH, F. V.

THINES, G. & VANDENBUSSCHE, E. The Effects of Alarm Substance on the Schooling Behaviour of *Rasbora heteromorpha* Duncker in Day and Night Conditions 296

TINDEL, JERRY R. *see* LARIMER, JAMES L.

TURKEWITZ, GERALD, BIRCH, HERBERT G., MOREAU, TINA, LEVY, LINDA & CORNWELL, ANNE C. Effect of Intensity of Auditory Stimulation on Directional Eye Movements in the Human Neonate 93

VANDENBUSSCHE, E. *see* THINES, G.

VANDERWOLF, C. H. Warm-up Effects in the Avoidance Performance of Rats with Medial Thalamic Lesions 425

VAN-TOLLER, C. *see* SMITH, F. V.

VINCE, MARGARET A. Potential Stimulation Produced by Avian Embryos 34

VINCE, MARGARET A. Artificial Acceleration of Hatching in Quail Embryos 389

VOLCANI, R. *see* FOLMAN, Y.

WAGNON, K. A., LOY, R. G., ROLLINS, W. C. & CARROL, F. D. Social Dominance in a Herd of Angus, Hereford and Shorthorn Cows 474

WARING, GEORGE H. Sounds and Communications of the Yellow-Bellied Marmot (*Marmota flaviventris*) 177

WATERS, VIRGINIA, *see* KOHN, ALAN J.

WENNER, ADRIAN M. & JOHNSON, DENNIS L. Simple Conditioning in Honey Bees 149

WENNER, ADRIAN M. *see also* JOHNSON, DENNIS L.

WEYANT, ROBERT G. Reversal Learning in Rats as a Function of the Type of Discrimination and the Criterion of Learning 4

WILLIAMS, D. *see* ALEXANDER, G.

WILLIAMS, TIMOTHY C., WILLIAMS, JANET M. & GRIFFIN, DONALD R. The Homing Ability of the Neotropical Bat *Phyllostomus hastatus* with Evidence for Visual Orientation .. 4

Symposium: 'The Role of Behaviour in Survival' 1

Symposium: 'The Effects of Early Experience on Adult Behaviour' 5

Book Reviews

BEACH, FRANK A. Sex and Behaviour 5

BUETTNER-JANUSCH, JOHN (Ed.) Evolutionary and Genetic Biology of Primates 1

DASMANN, R. F. (Ed.) Wildlife Biology 3

DEVORE, IRVEN (Ed.) Primate Behavior 3

ELTON, CHARLES. The Pattern of Animal Communities 5

FOSS, B. M. (Ed.) Determinants of Infant Behaviour, Vol. III 1

GROOT, C. On the Orientation of Young Sockeye Salmon (*Oncorhynchus nerka*) During Their Seaward Migration Out of Lakes 5

HASLER, A. D. Underwater Guideposts 5

JOHNSGARD, P. A. Handbook of Waterfowl Behaviour 1

MASTERS, W. H. & JOHNSON, V. E. Human Sexual Response 5

MCCLEARY, R. A. & MOORE, R. Y. Subcortical Mechanisms of Behaviour 5

POTTS, W. T. W. & PARRY, GWYNETH. Osmotic and Ionic Regulation in Animals 3

ROCKSTEIN, MORRIS (Ed.) The Physiology of Insecta, Vol. I 3

SCHMIDT-NIELSEN, KNUT. Desert Animals: Physiological Problems of Heat and Water .. 3

SCOTT, J. P. & FULLER, J. L. Genetics and the Social Behaviour of the Dog 5

The A.B.S. Guide to Recent Publications in the Social and Behavioural Sciences 3

This jouirnal is copyright. It may not be reproduced by any means, in whole or in part, without permission. Applications with regard to reproduction should be addressed to the Publishers.

Printed by Wellington Printers, Wellington, Som.